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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/675,215	09/30/2003	Alexander A. Maltsev	884.782US1	9929

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SCHWEGMAN, LUNDBERG, WOESSNER & KLUTH, P.A.
P.O. BOX 2938
MINNEAPOLIS, MN 55402

EXAMINER	
FLORES, LEON	

ART UNIT	PAPER NUMBER
2611	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/675,215	MALTSEV ET AL.	
	Examiner	Art Unit	
	Leon Flores	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 September 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-30* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-30* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *30 September 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *6/18/2004*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Specification

The following guidelines illustrate the preferred layout for the specification of a utility application. These guidelines are suggested for the applicant's use.

Arrangement of the Specification

As provided in 37 CFR 1.77(b), the specification of a utility application should include the following sections in order. Each of the lettered items should appear in upper case, without underlining or bold type, as a section heading. If no text follows the section heading, the phrase "Not Applicable" should follow the section heading:

(a) TITLE OF THE INVENTION.
(b) CROSS-REFERENCE TO RELATED APPLICATIONS.
(c) STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT.
(d) THE NAMES OF THE PARTIES TO A JOINT RESEARCH AGREEMENT.
(e) INCORPORATION-BY-REFERENCE OF MATERIAL SUBMITTED ON A COMPACT DISC.
(f) BACKGROUND OF THE INVENTION.
    (1) Field of the Invention.
    (2) Description of Related Art including information disclosed under 37 CFR 1.97 and 1.98.
(g) BRIEF SUMMARY OF THE INVENTION.
(h) BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S).
(i) DETAILED DESCRIPTION OF THE INVENTION.
(j) CLAIM OR CLAIMS (commencing on a separate sheet).
(k) ABSTRACT OF THE DISCLOSURE (commencing on a separate sheet).
(l) SEQUENCE LISTING (See MPEP § 2424 and 37 CFR 1.821-1.825. A "Sequence Listing" is required on paper if the application discloses a nucleotide or amino acid sequence as defined in 37 CFR 1.821(a) and if the required "Sequence Listing" is not submitted as an electronic document on compact disc).

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

2. **Claims (1-2, 13-14, 22, 28-29) are rejected under 35 U.S.C. 102(a) as being anticipated by Crawford (US Publication 2002/0159533 A1).**

Re claim 1, Crawford discloses a method comprising: generating a phase compensation estimate for a data symbol of an orthogonal frequency division multiplexed (OFDM) packet from pilot sub-carriers within the data symbol. (See fig. 3: 300 & paragraph 45)

Re claim 2, Crawford further discloses applying the phase compensation estimate to sub-carriers of the data symbol prior to de-mapping. (See fig. 3: 302)

Re claim 13, Crawford further discloses performing a Fast Fourier Transform (FFT) on the plurality of parallel groups of time-domain samples that represent the data symbol to generate frequency domain symbol modulated sub-carriers prior to applying the phase compensation estimate (See fig. 3: 304); separating the pilot sub-carriers from data sub-carriers of the frequency domain symbol modulated sub-carriers for use in generating the phase compensation estimate (See fig. 3: 306 & paragraphs 48-49);

and de-mapping the data symbol after applying the phase compensation estimate to generate at least a portion of a decoded bit stream. (See fig. 3. It is inherent that the rotated signal will be outputted to a decoder.)

Re claim 14, Crawford further discloses wherein the pilot sub-carriers are comprised of modulated pilot symbols having known training values and modulated on a predetermined portion of sub-carriers of the plurality. (See fig. 2 & paragraphs 42-44)

Claim 22 is a system claim corresponding to method claim 1. Hence, the steps performed in method claim 1 would have necessitated the elements in system claim 22. Therefore, claim 22 has been analyzed and rejected w/r to claim 1 above.

Claim 28 has been analyzed and rejected w/r to claim 1 above.

Re claim 29, Crawford further discloses wherein the instructions, when executed by the computing platform, further result in repeating generating and applying for subsequent data symbols of the OFDM packet, and wherein the data symbol is comprised of a plurality of symbol modulated sub-carriers, at least some of the symbol-modulated sub-carriers of the plurality being the pilot sub-carriers. (See fig. 2 & paragraphs 42-44)

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims (3-12, 15-21, 23-27, 29-30) are rejected under 35 U.S.C. 103(a) as being unpatentable over Crawford (US Publication 2002/0159533 A1), as applied to claim 1 above, and further in view of Perets et al (hereinafter Perets), *"A New Phase and Frequency Offset Estimation Algorithm for OFDM Systems Applying Kalman Filter"*, Department of Electrical Engineering-Systems, Tel Aviv University, December 2002.

5. Re claim 3, Crawford further discloses repeating generating and applying for subsequent data symbols of the OFDM packet, and wherein the data symbol is comprised of a plurality of symbol modulated sub-carriers, at least some of the symbol-modulated sub-carriers of the plurality being the pilot sub-carriers, and wherein generating the phase compensation estimate comprises:

But the reference of Crawford fails to specifically disclose combining the pilot sub-carriers in an observation vector former to generate an observation vector; and recursively filtering the observation vector to generate the phase compensation estimate.

However, Perets does. (See sections 3 & 4) Perets discloses a method for estimating the phase and frequency offset by using an extended Kalman filter algorithm.

This algorithm estimates and tracks the phase and frequency offsets in an OFDM system.

Therefore, taking the combined teachings of Crawford and Perets as a whole. It would have been obvious to one of ordinary skills in the art to have incorporated this feature into the system of Crawford, in the manner as claimed, and as taught by Perets, for the benefit of achieving fast convergence and good tracking ability. (See abstract)

Re claim 4, the combination of Crawford and Perets further discloses wherein repeating generating the phase compensation estimate comprises: combining the pilot sub-carriers of a present data symbol to generate an observation vector for the present data symbol; and performing recursive filtering on the observation vector for the present data symbol to generate the phase compensation estimate for the present data symbol. (See sections 3 & 4)

Re claim 5, the combination of Crawford and Perets further discloses wherein repeating generating the phase compensation estimates comprises: combining the pilot sub-carriers of a present data symbol to generate an observation vector for the present data symbol; and performing recursive filtering on the observation vector for the present data symbol to generate a frequency offset estimate and the phase compensation estimates for a next data symbol. (In Perets, see sections 3 & 4)

Re claim 6, the combination of Crawford and Perets further discloses wherein recursively filtering comprises performing extended Kalman filtering on the observation vector using a channel estimate, an additive noise power estimate, a signal to noise ratio (SNR) estimate, a priori information about a dynamic model of phase, and a phase noise power value from a phase noise spectrum of transceiver oscillators. (In Perets, see sections 3 & 4)

Re claim 7, the combination of Crawford and Perets further discloses wherein the channel estimate is generated from a long training symbol of the OFDM packet, and wherein the additive noise power estimate and the SNR estimate are generated from short training symbols of the OFDM packet. (In Crawford, see fig. 2 & paragraphs 43)

Re claim 8, the combination of Crawford and Perets further discloses wherein the OFDM packet is comprised of a plurality of sequential symbol modulated sub-carriers, beginning with the short training symbols modulated on a portion of the sub-carriers followed by the long training symbol and a plurality of data symbols, the data symbols containing at least one known pilot sub-carrier, and wherein the channel estimate, the additive noise power estimate, the SNR estimate, and the phase noise power value are used substantially for data symbols of the OFDM packet. (In Crawford, see fig. 2 & paragraphs 42-45)

Re claim 9, the combination of Crawford and Perets further discloses wherein combining includes weighting the pilot sub-carriers based on fading gains for the pilot sub-carriers prior to combining the weighted sub-carriers in generating the observation vector, and wherein the method further comprises generating a channel estimate from long training symbols of the OFDM packet, and wherein weighting includes applying weights to pilot sub-carriers, the weights being complex conjugates of the fading gains of the pilot sub-carriers, the fading gains being determined from the channel estimate. (In Perets, see sections 3 & 4)

Re claim 10, the combination of Crawford and Perets further discloses wherein recursively filtering comprises: subtracting a predicted observation vector from the observation vector to generate a residual vector; multiplying the residual vector by a gain matrix to generate a residual gain vector; adding the residual gain vector to a linear prediction vector to generate an estimate vector; and extracting a frequency offset estimate and the phase compensation estimate for the data symbol from the estimate vector. (In Perets, see sections 3 & 4)

Re claim 11, the combination of Crawford and Perets further discloses wherein the estimate vector is a multi-dimensional vector comprised of the frequency offset estimate and the phase compensation estimate (In Perets, see section 3 & 4), and wherein the phase compensation estimate is applied to a data symbol subsequent to performing a Fast Fourier Transform (FFT) on the data symbol. (In Crawford, see

paragraph 109)

Re claim 12, the combination of Crawford and Perets further discloses wherein the estimate vector is a multi-dimensional vector comprised of a frequency offset estimate and the phase compensation estimate (In Perets, see section 3 & 4), and wherein the method further comprises rotating a phase of a serial symbol stream comprising the data symbol prior to performing a Fast Fourier Transform on the data symbol. (In Crawford, see fig. 3)

Claim 15 has been analyzed and rejected w/r to claims 3 & 6 above. Furthemore, the motivation for combining these two references has already been established in claim 3.

Claim 16 is a system claim corresponding to method claim 9. Hence, the steps performed in method claim 9 would have necessitated the elements in system claim 16. Therefore, claim 16 has been analyzed and rejected w/r to claim 9 above.

Claim 17 is a system claim corresponding to method claim 9. Hence, the steps performed in method claim 9 would have necessitated the elements in system claim 17. Therefore, claim 17 has been analyzed and rejected w/r to claim 9 above.

Claim 18 is a system claim corresponding to method claim 3. Hence, the steps performed in method claim 3 would have necessitated the elements in system claim 18.

Therefore, claim 18 has been analyzed and rejected w/r to claim 3 above.

Claim 19 is a system claim corresponding to method claim 4. Hence, the steps performed in method claim 4 would have necessitated the elements in system claim 19. Therefore, claim 19 has been analyzed and rejected w/r to claim 4 above.

Claim 20 is a system claim corresponding to method claim 10. Hence, the steps performed in method claim 10 would have necessitated the elements in system claim 20. Therefore, claim 20 has been analyzed and rejected w/r to claim 10 above.

Claim 21 is a system claim corresponding to method claims 10 & 11. Hence, the steps performed in method claims 10 & 11 would have necessitated the elements in system claim 21. Therefore, claim 21 has been analyzed and rejected w/r to claims 10 & 11 above.

Claim 23 is a system claim corresponding to method claims 3 & 6. Hence, the steps performed in method claims 3 & 6 would have necessitated the elements in system claim 23. Therefore, claim 23 has been analyzed and rejected w/r to claims 3 & 6 above.

Claim 24 is a system claim corresponding to method claim 9. Hence, the steps performed in method claim 9 would have necessitated the elements in system claim 24. Therefore, claim 24 has been analyzed and rejected w/r to claim 9 above.

Claim 25 is a system claim corresponding to method claim 9. Hence, the steps performed in method claim 9 would have necessitated the elements in system claim 25. Therefore, claim 25 has been analyzed and rejected w/r to claim 9 above.

Claim 26 is a system claim corresponding to method claim 6. Hence, the steps performed in method claim 6 would have necessitated the elements in system claim 26. Therefore, claim 26 has been analyzed and rejected w/r to claim 6 above.

Claim 27 is a system claim corresponding to method claim 7. Hence, the steps performed in method claim 7 would have necessitated the elements in system claim 27. Therefore, claim 27 has been analyzed and rejected w/r to claim 7 above.

Claim 30 is a system claim corresponding to method claims 3 & 4. Hence, the steps performed in method claims 3 & 4 would have necessitated the elements in system claim 30. Therefore, claim 30 has been analyzed and rejected w/r to claims 3 & 4 above.

Contact

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Leon Flores whose telephone number is 571-270-1201. The examiner can normally be reached on Mon-Fri 7-5pm Alternate Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Payne can be reached on 571-272-3024. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

LF
May 1, 2007

David C. Payne
DAVID C. PAYNE
SUPERVISORY PATENT EXAMINER